



OMI Multiwavelength Aerosol Product (OMAERO) Validation Status

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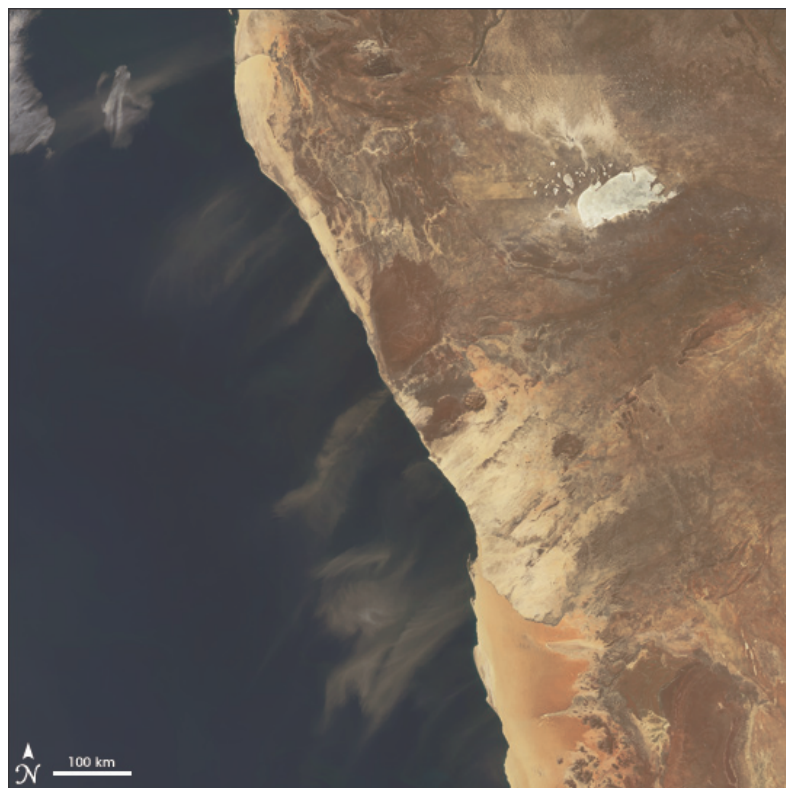
Outline

- Ocean comparisons with other satellite instruments
- Monthly land averages
- Comparisons with AERONET
- Other people's validation efforts
- Outlook and summary

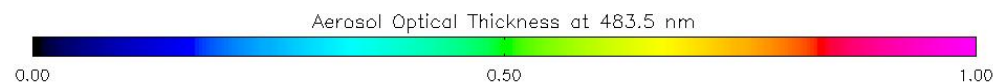
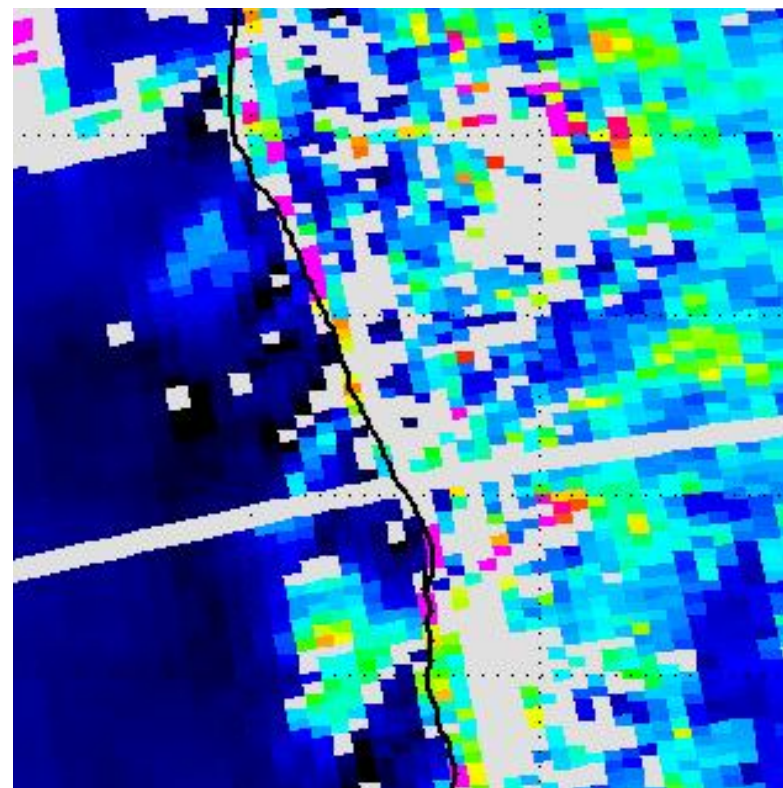
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OMAERO Data Example – Namibia

MODIS-Aqua, 10 July, 2005



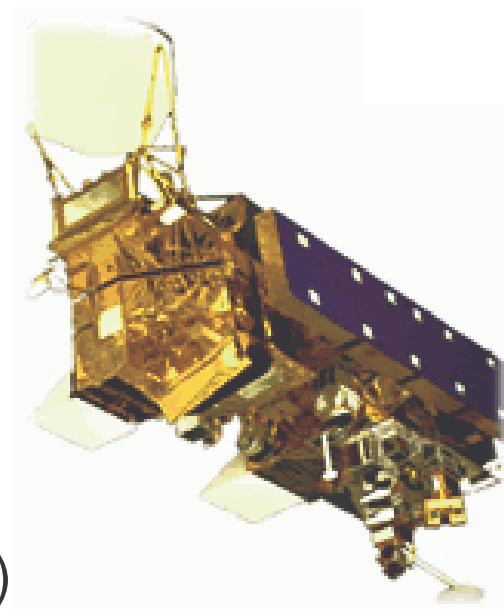
OMAERO AOT at 483.5 nm



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MODIS Aerosol Product

MODIS on board of EOS-Aqua
~15 minutes ahead of OMI/Aura
on the A-Train



Aerosol product: MYD04 (collection 5)

Notable differences between MYD04 and OMAERO

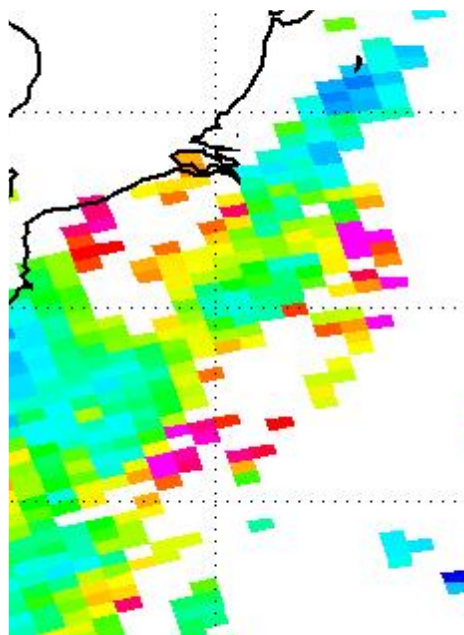
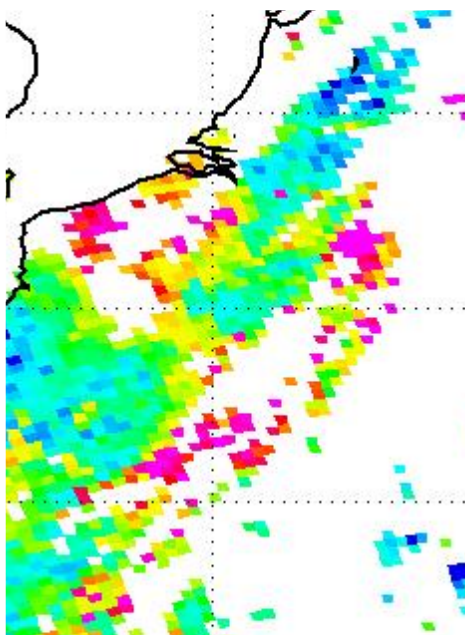
- Wavelengths: 470 – 2130 nm (OMI: 343.5 – 483.5 nm)
- Footprint: 10 x 10 km² (OMI: 13 x 24 km²)
- AOT = average of (>12 out of 400) cloud-free subpixels
- QA flags based on fit RMS, number of cloud-free subpixels,...



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Comparison Procedure

MODIS AOT averaged using overlap areas as weights



Diagnostic parameters:

- % coverage of OMI pixel by sufficiently cloud-free MODIS pixels
- MODIS QA flags

Results of OMAERO-MODIS Comparisons

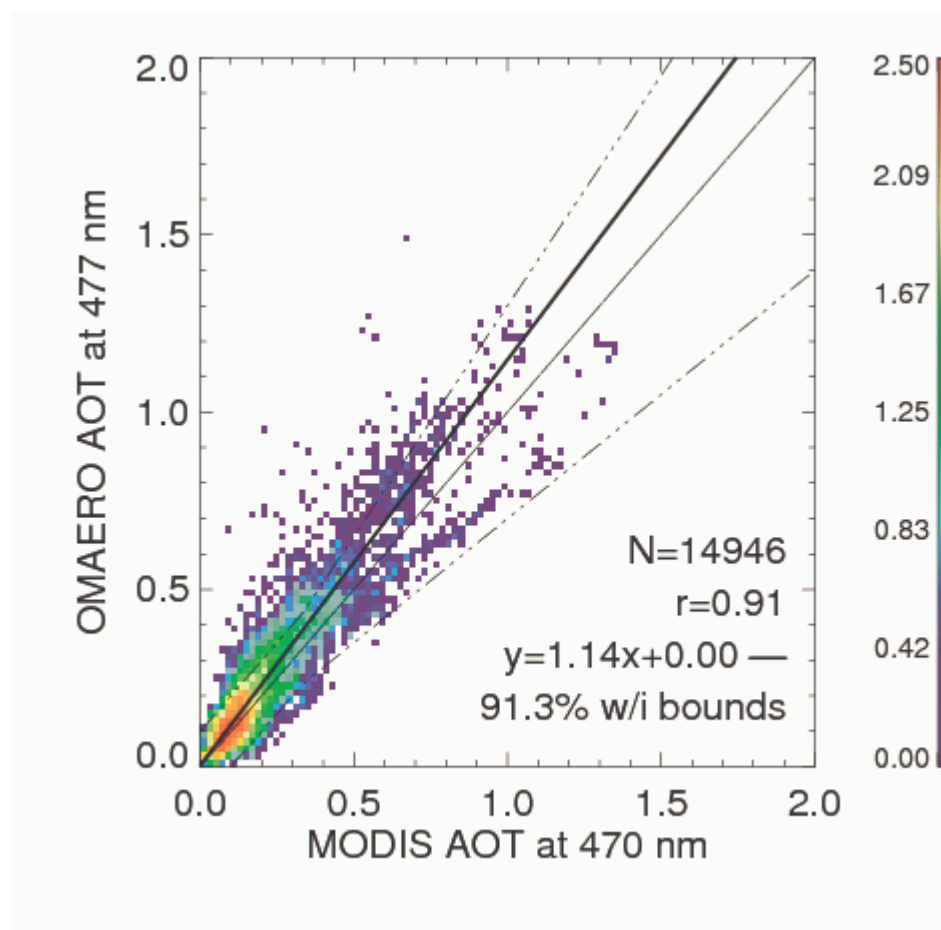
1-8 June 2006

Oceans worldwide

No sunglint

ALL collocations
(regardless of OMI/MODIS
coverage and MODIS QA)

Only pixels completely
covered by sufficiently
cloud-free and quality-
assured MODIS pixels



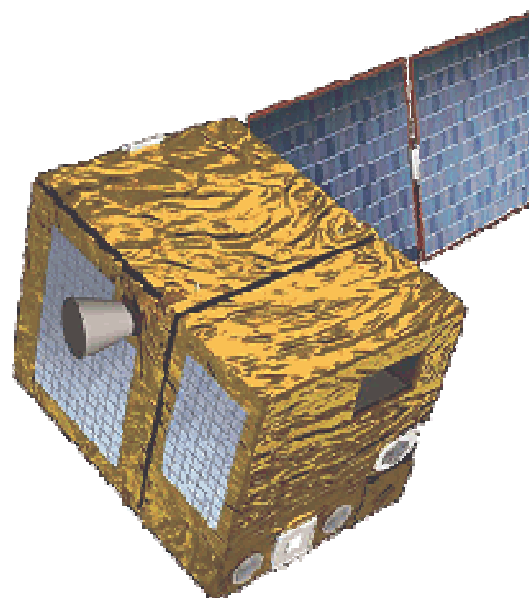
Good agreement with quality-assured MODIS AOT

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PARASOL Aerosol Product

PARASOL ~14 minutes ahead of
OMI/Aura on the A-Train

Ocean aerosol product:
P3L2TOGC version J



Notable differences between PARASOL and OMAERO

- Wavelengths 443-1020 nm; AOT reported at 670 and 865 nm
- Polarization capability
- Scenes viewed from multiple directions
- Resolution ~18 x 18 km² at the equator
- QA parameter based on fit RMS



Comparison Procedure

Simpler regridding scheme since PARASOL data are not organized as pixels but as gridded cells.

For an OMI pixel, PARASOL AOT is taken from the PARASOL grid cell in which the OMI pixel center lies.

Results of OMAERO-PARASOL Comparisons

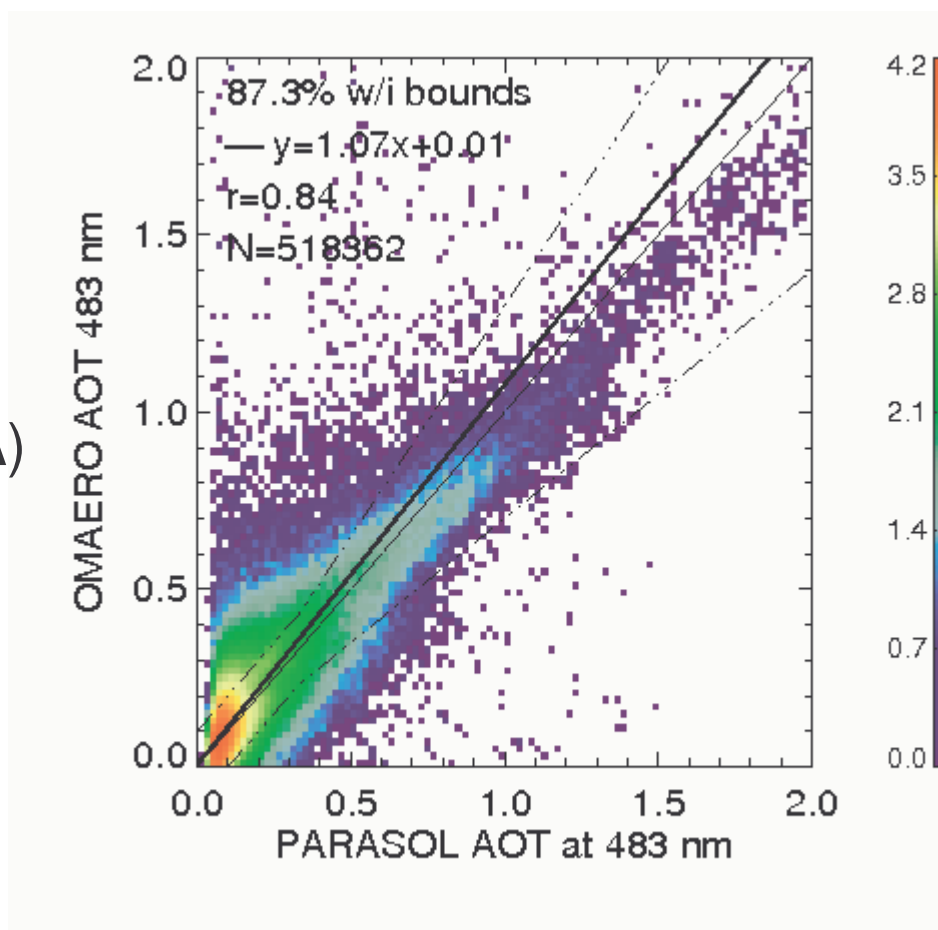
1-31 July 2006

Oceans worldwide

No sunglint

ALL collocations
(regardless of PARASOL QA)

Only 50% best PARASOL
data (lowest RMS)



Good agreement with quality-assured PARASOL AOT

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OMI Near-UV Aerosol Product (OMAERUV)

Same instrument

Collection-2 publicly released product

Notable differences:

- Wavelengths 354 and 388 nm
- Other models and a-priori choices
- QA flag = 0 if AOT is reliable, else possibly cloud-contaminated

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Results of OMAERO-OMAERUV Comparisons

1-21 June 2006

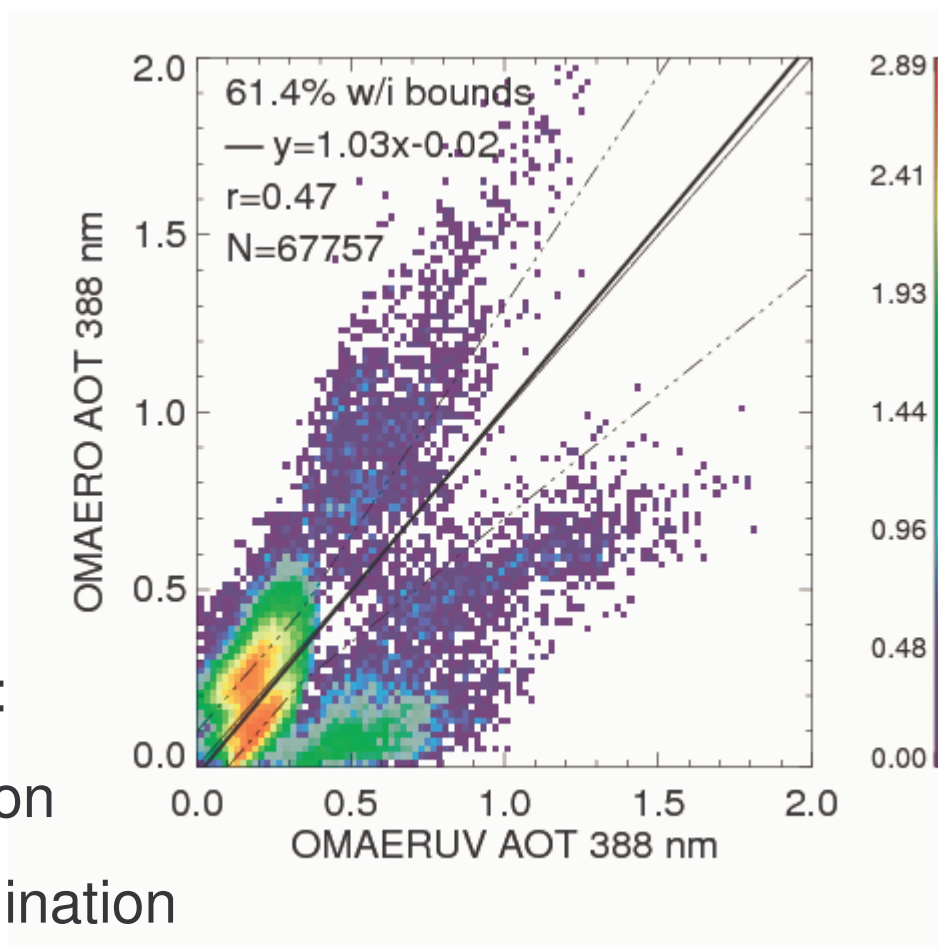
Oceans worldwide

No sunglint

OMAERUV QA=0 only

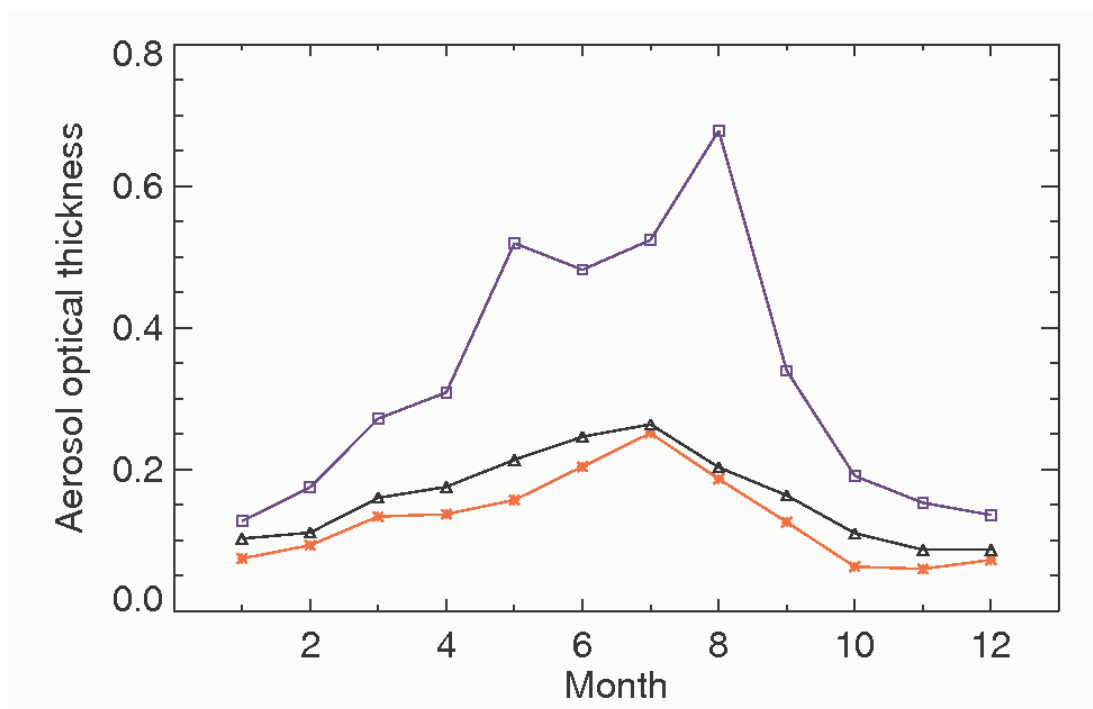
Multimodality may be due to:

- Differences in type attribution
- Enhanced by cloud contamination and differences in surface albedo



Monthly averages

Averages over a 20x25-degree region over Eastern U.S.



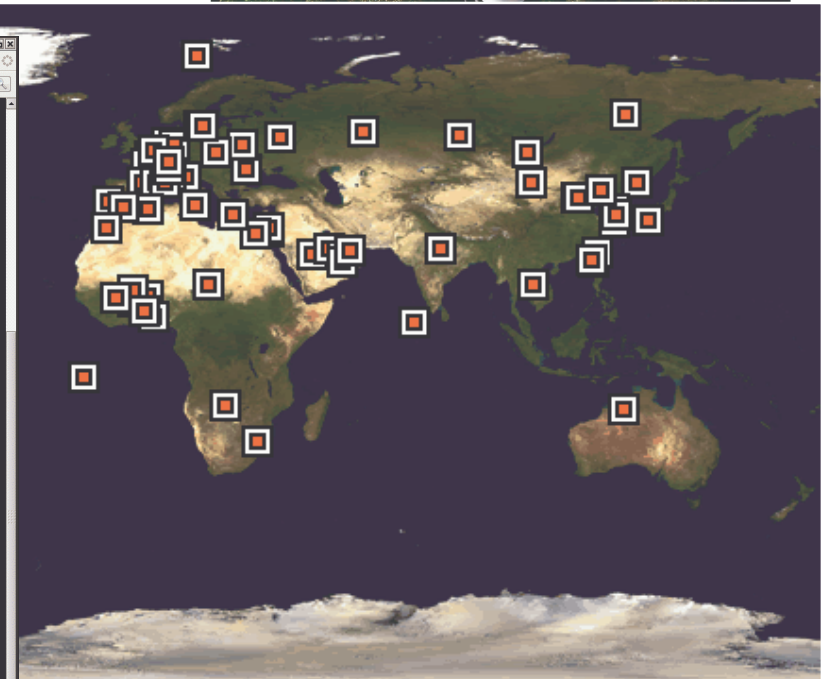
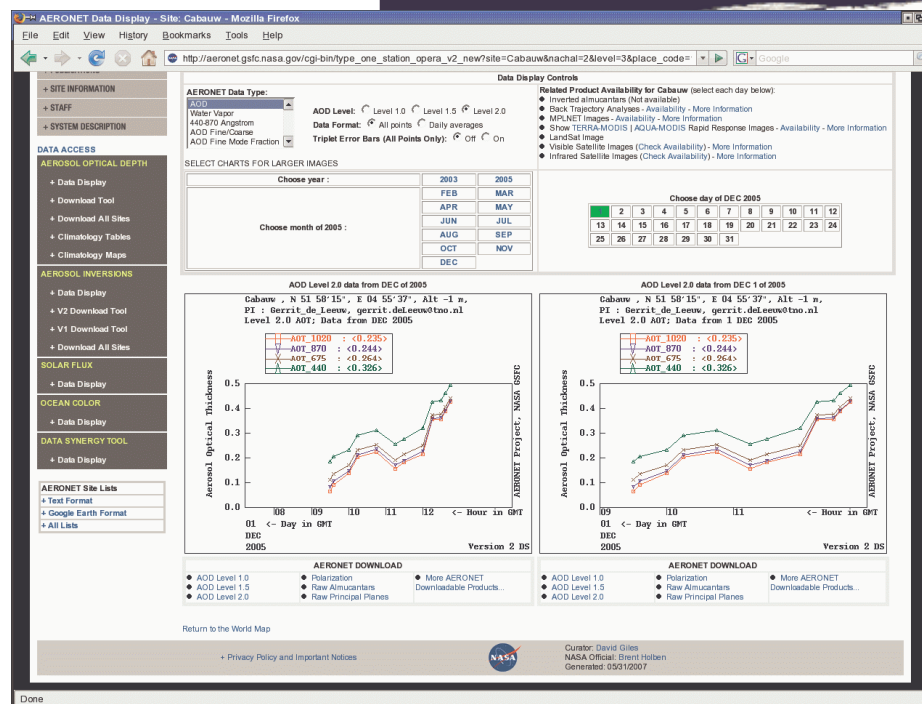
Blue OMAERO (483.5 nm), **Red** MODIS (550 nm), **Black** MISR (555 nm)

Over land: Trends are rendered well, positive bias

AERONET

AErosol RObotic NETwork

- CIMEL Sunphotometers
- About 120 stations active worldwide
- AOT (340-1020 nm) every 15 minutes

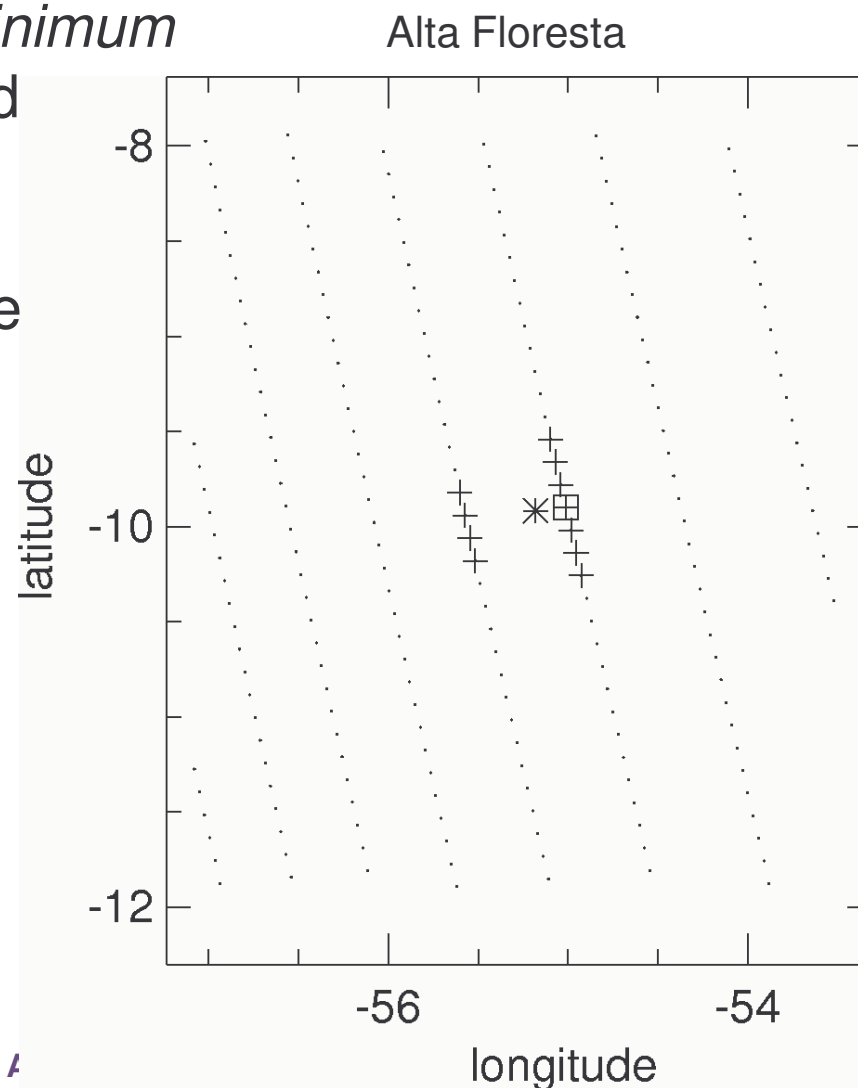


AERONET – Comparison Procedure

OMAERO: Pixel 13 x 24 km² *minimum*

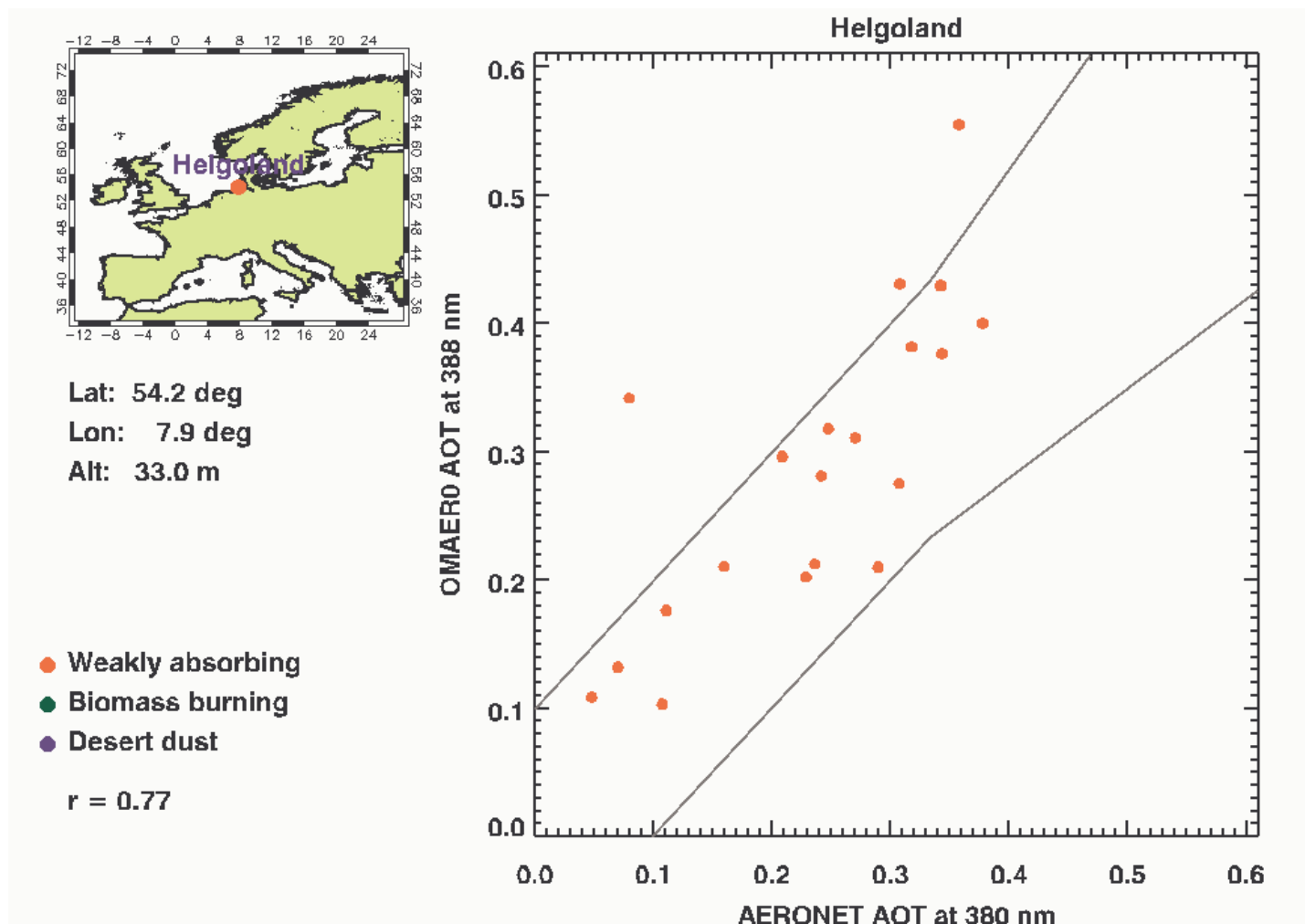
AERONET: Much more localized

Strategy: compare
OMAERO 50-km-radius average
with AERONET 1-hour average



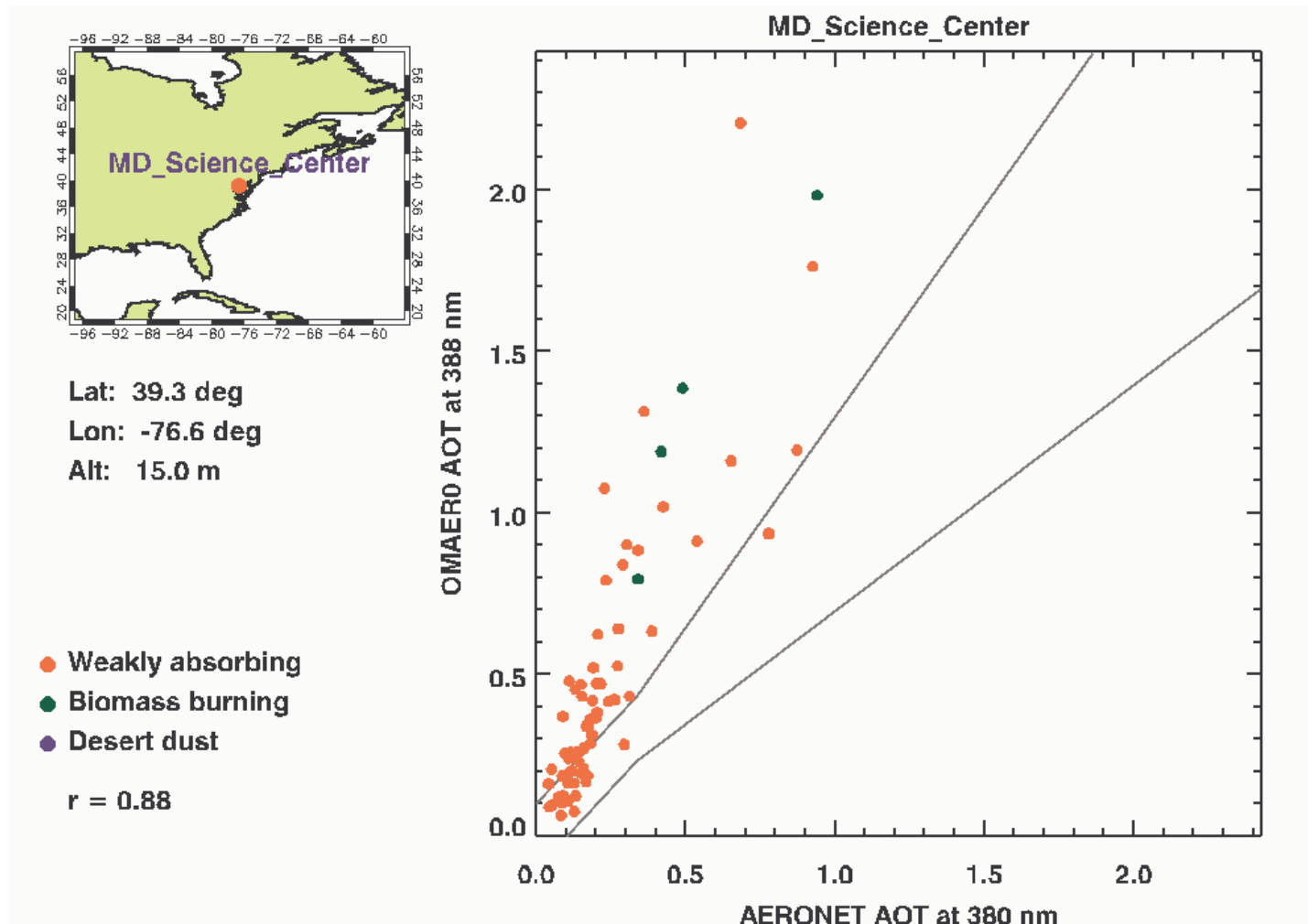
AERONET Comparison Examples – 2005

Heligoland – Best result!



AERONET Comparison Examples – 2005

MD Science Center *OMAERO tends to overestimate over land*



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Other OMAERO Validation

- Tim Vlemmix (KNMI)
Good correlation with GLOBE handheld photometers operated by students in the Netherlands
- John Livingston (NASA-Ames)
Positive bias OMAERO w.r.t. aircraft measurements
- Virginie Buchard (LOA) – Photometer Villeneuve d'Ascq
Ongoing study
- Alex Kokhanovsky (University of Bremen)
Good correlation with MISR, MODIS, AATSR for cloud-free scene over Germany
- Lyana Curier (TNO-FEL)
Strong site-dependent correlation of AOT with AERONET data

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Conclusions

- Ocean AOT agrees well with quality-assured reference data
- We recommend using the OMAERO product over **oceans** for **quantitative** analyses.
- Over land, OMAERO tends to overestimate the AOT with respect to ground-based and satellite reference data
- We recommend using the OMAERO product over **land** for **qualitative** analyses,

Availability

- OMAERO on <http://disc.gsfc.nasa.gov>
- Or contact Ben Veihelmann (veihelma@knmi.nl)

Outlook

- Resume land validation with surface albedo clim. from OMI
- Do more validation with AERONET (“ground truth”)
- Analyze discrepancies OMAERO – OMAERUV
- Investigate overestimation of AOT
 - ➔ Possible candidates: clouds, surface albedo, type/height misattribution
- Assess other aerosol parameters (SSA, size, height, AAI)